

May 23, 1939.

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2,159,879

PNEUMATIC CONTROL APPARATUS

Filed Feb. 4, 1937

FIG. 1.

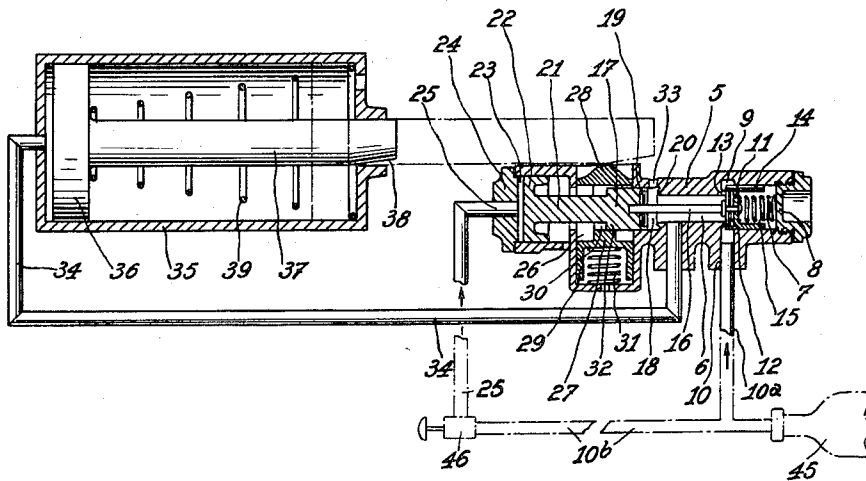
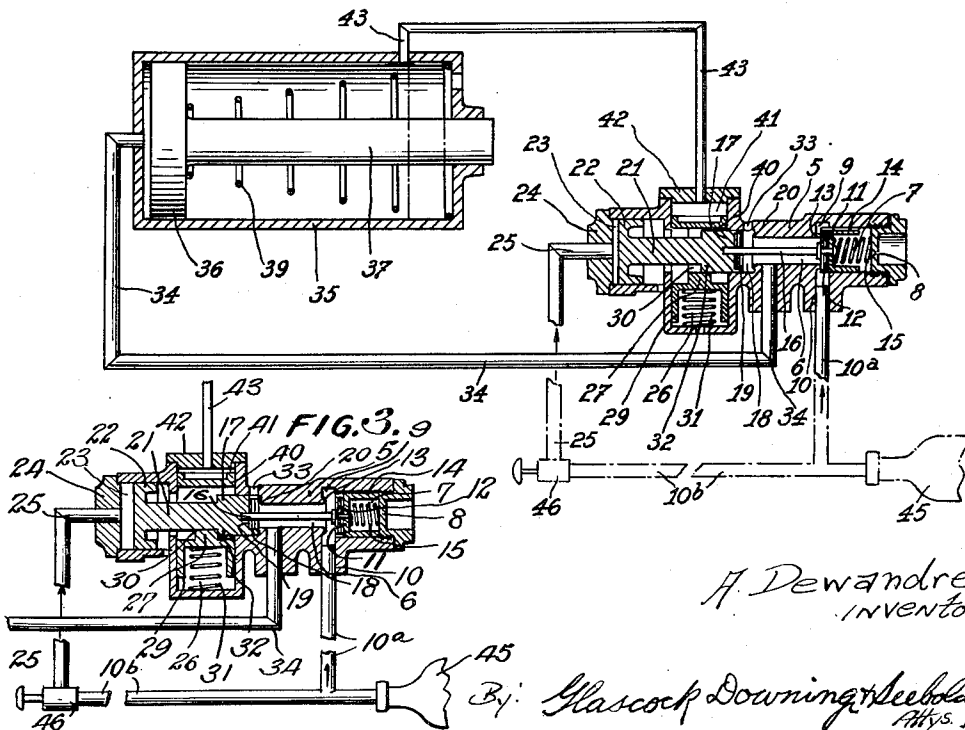


FIG. 2.



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UNITED STATES PATENT OFFICE

2,159,879

PNEUMATIC CONTROL APPARATUS

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Application February 4, 1937, Serial No. 124,096
In France February 7, 1936

1 Claim. (Cl. 121—38)

My invention relates to a pneumatic apparatus for controlling at a distance the displacement of a mechanical member.

In certain apparatus of this kind wherein use is made of a cylinder with driving piston actuated by compressed fluid in order to control the displacements of some mechanical member, it is sometimes difficult for the operator to ascertain by inspection whether the duration of the action on the fluid distributor has been sufficient in order to permit the piston to effect a determined displacement particularly when the driving cylinder has a certain volume.

The object of the present invention is to establish an apparatus wherein the amplitude of displacement of the driving piston is independent of the duration of the action of the operator on the fluid distributor.

According to my invention a distributor of compressed fluid, remotely controlled is, upon its actuation, locked in its open position and is subsequently automatically unlocked with closure of the said distributor when a driving piston actuated by the delivered fluid and acting on the mechanical member to be displaced has experienced a displacement of predetermined amplitude.

Two forms of embodiment of the device according to the invention will be described below by way of example only with reference to the attached drawing, in which:

Figure 1 is a diagrammatic view in section of the apparatus with mechanical unlocking of the distributor;

Figure 2 is a view similar to Figure 1 showing a modification of the device with pneumatic unlocking of the distributor.

Fig. 3 is a fragmentary sectional detail showing the valve and latch in operative position.

In these figures the fluid distributor presents a body 5 in which is arranged a chamber 6 in the extension of which is formed a cylinder 7 closed at its outer end by a plug 8 and communicating by an annular recess 9 with an orifice 10 leading into the conduit 10a connecting the distributor to the source of compressed fluid 45.

In the cylinder 7 slides a piston or valve 11 carrying at its head a packing 12 of resilient material resistant to the action of oil, the said piston presenting on its cylindrical surface longitudinal grooves 14 through which flows the fluid under pressure intended to act behind the piston in conjunction with a spring 15 in order to apply the packing 12 hermetically on its seat 13 and to normally close all communication between the source of fluid and the chamber 6.

A rod 16 secured axially in the head of the piston 11 extends through the chamber 6 and is connected to a valve 17 sliding in a bore 18 provided in the extension of the said chamber 6.

This valve 17 is provided with a packing 19, preferably of resilient material, resistant to the action of oil intended to abut on an annular seat 20 provided in the body 5.

A cylindrical portion 21 of diameter less than the valve 17 connects the latter to any type of control member.

This member is preferably a piston 22 or the like sliding in a cylinder 23 formed at the end of the body 5, the bottom of this cylinder being closed by a plug 24 into which leads a conduit 25 connected to a distributor of compressed fluid 46 arranged within reach of the operator's hand and connected to the source of fluid 45 by means of the conduit 10b.

In a bore 26 arranged perpendicularly to the body 5 of the distributor and traversing the latter from one end to the other slides a bolt 27 comprising at one of its ends a cam 28, and at its other end a guiding piston 29, the body of this bolt presenting a constricted part in which is arranged an opening 30 permitting the easy passage of the valve 17.

This bolt is subjected to the action of a spring 31 in such a way that when the valve 17 is displaced in order to abut on its seat 20 the bolt 27 is pushed upwards so as to engage against the shoulder 32 formed behind the valve 17.

An opening is provided at 33 in the body 5 in order to put the chambers 18 and 6 in communication with the atmosphere.

A conduit 34 connects the chamber 6 to a cylinder 35 provided with a piston 36 of which the rod 37 presents, at its end, an inclined surface 38 intended to operate on the cam 28 in order to disengage the bolt 27 when the piston 36 upon its displacements arrives at the end of the stroke.

The latter piston moves against the opposing action of a spring 39 or of any other opposing means provided in the mechanical member (not shown) controlled by the said piston rod.

The operation of the apparatus is as follows:

When the operator acts for a short time (a fraction of a second is sufficient) on the control distributor 46, the fluid under pressure led through the conduit 25 into the cylinder 23 of very small capacity, pushes back the piston 22 in order to cause the valve 17 to abut on its seat 20, closing the aperture 33 and opening the valve 11, while the bolt 27, under the action of

the spring 31, engages behind the shoulder 32 locking the valves in this new position.

The fluid under pressure led from the source 45 by the conduit 10a can flow through the chamber 6, the conduit 34, and passes into the cylinder 35 pushing back the piston 36.

When the latter arrives at the end of its stroke the inclined surface 38 of the rod 37 operates on the cam 28 unlocking the valves 17 and 11 and causing them to return to their original position under the action of the spring 15, and closing communication with the source of fluid and opening communication with the atmosphere.

The air under pressure contained in the cylinder 35 can then escape to the atmosphere through the conduit 34, the chambers 6 and 18 and the orifice 33, the piston 36 returning to its position of rest under the action of the spring 39.

It is to be noted that the bolt 27 must not necessarily be actuated directly by the rod 37 of the piston, but can just as well be actuated by an intermediate member provided with a cam, an inclined surface or similar means against which the piston or its rod would operate at the end of the stroke.

In the modification shown in Figure 2 the apparatus is differentiated only by the feature that the unlocking of the distributor is obtained pneumatically.

For this purpose the bolt 27 presents at its upper part a piston 40 sliding in a pump chamber 41 formed in the body 5 closed at its end by a plug 42.

A conduit 43 connects the chamber 41 to the cylinder 35 in such a way that when the fluid operates and displaces the piston 36, the latter in arriving towards the end of its active stroke uncovers the orifice of the conduit 43 in order to permit the fluid under pressure to pass into the chamber 41 and to push back the piston 40

against the opposing action of the spring 31, thus operating the unlocking of the valves.

What I claim is:

In a pneumatic apparatus for the remote control of the displacement of a mechanical member by means of an auxiliary driving apparatus, in combination with a source of pneumatic fluid, a cylinder for the said auxiliary driving apparatus, a piston in said cylinder, a fluid distributor, valves in the said distributor for being displaced against the opposing action of resilient means and for controlling the communication of the said auxiliary driving apparatus with the source of fluid and with the atmosphere, a driving rod for said valves, a groove provided in said driving rod, a piston integral with the said driving rod for sliding in a cylinder provided at the said distributor, a remote manually controlled distributor to open the connection between the last said cylinder and the source of fluid, a bolt subjected to the opposing action of a spring and located transversely with respect to the said driving rod for automatically engaging the groove provided in the latter when the said valves are brought into their position for delivery of fluid to the said auxiliary driving apparatus, a piston integral with the said bolt, a cylinder integral with the distributor and having the last said piston slidably mounted therein, an aperture provided at the predetermined point of the cylindrical wall of the auxiliary driving apparatus, a conduit opening into the said aperture to connect the said auxiliary motor to the last said cylinder for opening the communication of the latter with the fluid delivered into the cylinder of the auxiliary driving apparatus and for automatically disengaging the said bolt when the piston of the said auxiliary driving apparatus has effected a predetermined displacement and uncovers the said aperture.

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